Appendix H
The Impacts of Section 7 Implementation on Pesticide Use

The Environmental Protection Agency (EPA) was recently enjoined from authorizing the application of a set of pesticides within a certain distance from "salmon supporting waters."[1] For aerial applications, the distance is 100 yards; for ground applications, the distance is 20 yards. The basis for this injunction was the EPA's failure to consult with NOAA Fisheries concerning possible adverse effects of pesticide application on ESA-protected salmon and O. mykiss. The injunction was allowed to remain in place by the Ninth Circuit Court of Appeals, and so as of the date of this report, the court-ordered restriction continues to apply pending appeal (Columbia Basin Bulletin 2004).

The effect of this injunction is to create an additional set of activities to be considered in the analysis, in that the restrictions on pesticide use can be viewed as a habitat-related impact of section 7. This is because the basis for the court's decision was section 7 of the ESA, not section 9 (that is, the court applied the jeopardy standard, not the take standard, for the ESA-listed salmon and O. mykiss). For that reason, the impacts of the restrictions are co-extensive with the designation of critical habitat for the seven salmon and O. mykiss ESUs and so should be considered in this analysis. Because of the timing of the injunction, NOAA Fisheries does not yet have sufficient data to estimate these impacts at the watershed level. This appendix presents preliminary estimates of the impacts at the ESU level and for all ESUs as a whole.

H 1. Estimating the Impacts of Restrictions on Pesticide Use

Pesticides are one of many inputs into the agricultural production process. When land (owned or rented) is used for agriculture, the output is the result of a series of economic choices. At the highest level is the choice to use the land for agriculture or for some alternate type of use. Beyond this there are myriad choices of which crops to grow; where, how, and when to grow them; how and how much to supply other inputs such as fertilizer and irrigation; how and when to harvest the production; how and how much to manage potential crop damage with pesticides and other pest or disease control methods; and so on.

In many cases, the chosen course of action is one among many possibilities, some of which may be close to the preferred one in terms of the economic value obtained; in other cases, circumstances or the nature of the possibilities make one choice significantly better than all others or even the only choice that produces a positive return. And in all instances, the choices may be constrained by law or regulation, effectively limiting the availability and value of the alternatives.

In this economic view of agricultural production, the court's injunction on the use of certain pesticides can be taken as an additional constraint on the agricultural production process. A static view of this constraint assumes that the agricultural production process does not adjust to mitigate

[1] Washington Toxics Coalition, et al., v. EPA, C01-0132 (W.D. WA), 22 January 2004.

the effects of the pesticide restrictions. Assuming that no crops could be grown or that no other use of the land is possible, the impact is the lost net value of the production from the lands covered by the court injunction.

This static view, however, will not produce an accurate estimate of the actual impact for two reasons, each of which introduces bias in a different direction. The static view overestimates the actual impact if there are alternatives that retain some positive value for the affected lands. These alternatives span the full set of choices, both short-term and long-term, that are not constrained by law or regulation. For example, there may be alternative pesticides that do not adversely affect salmon or O. mykiss, or even other pest-control methods, that have higher costs or lower effectiveness (or both) but still allow the producer to obtain a positive return from the land. Similarly, there may be other crops or even other uses of the land that obtain the same result. Within the court's injunction itself, it is possible to reduce the extent of the restriction by switching from aerial to ground pesticide applications. While this may entail higher costs, it may still provide a positive return and so be preferable to no production at all. For these examples, the static view will overestimate the impact of the restriction. Working in the opposite direction is the fact that the inability to apply pesticides in one area may increase the costs of production in adjacent areas. In this case, the static view underestimates the impact of the restriction.

Accounting for the myriad possible responses to a restriction on pesticides entails gathering significantly more data as well as modeling the agricultural process in more sophisticated ways. NOAA Fisheries has not yet developed the models nor gathered sufficient data to estimate the impacts in this way. NOAA has begun the process of doing so and intends to produce impact estimates at the watershed level before the final rule is promulgated. These efforts will focus on two major questions: 1) What types and how many acres of land are constrained by the pesticide restriction? and 2) For each type of land affected by the restriction, what is the impact of the restriction (measured on a per-acre basis)?

For the first question, this effort will focus on agricultural land uses but will also consider non-agricultural land uses that may also be affected by the restriction. For the second question, it will investigate how the value of the impact is determined by various factors, including the following:

- Type of land use
- Geographic location (State, County)
- Opportunities for mitigating the impacts of the restriction, including
  - Substitute pesticides (that are not restricted by section 7 implementation)
  - Substitute land management practices
  - Substitute land uses
- Indirect impacts of pesticide restrictions

H 2. Estimated Impacts of Restrictions on Pesticide Use for the Seven California ESUs

This appendix provides preliminary estimates using the static view described above. These estimates are based on land use data for California. These estimates were derived according to the following steps. First, information was gathered from Federal and State agencies to determine the geographic area occupied by the seven Pacific salmon and O. mykiss ESUs at the time of their listing. The rivers and streams in this area correspond to the extent of the "salmon bearing waters," to use the court language, that were then considered in the analysis. This information was translated into a GIS database to identify boundaries that correspond to the court-ordered buffer widths of 100 and 20 yards on each side of the rivers and streams.

This analysis then used National Land Cover Data (NLCD) to estimate the acreage within the buffers of agricultural land uses potentially affected by the court injunction.[2] Three land use categories as defined by the North American Industry Classification System (NAICS) are assessed: fruit and tree nut farming (NAICS Code 1113), vegetable and melon farming (NAICS Code 1112), and oil seed and grain farming (NAICS Code 1111). The National Agricultural Statistics Service 2002 Census of Agriculture was consulted to determine the value of sales of each of these crop categories for the State of California. The value of sales estimates per crop category were then netted of total farm expenses of operation for the same crop categories within the State of California to estimate the net cash farm income of operations for California for crops relevant to this analysis. This statewide estimate was then divided by the total acres harvested of the relevant crops within California to estimate the net cash farm income (net revenue) per acre for each of the relevant crop categories. The results of this methodology as applied to each of the salmon-bearing buffer acreages are highlighted in Table H-1.

[2] The extent of salmon-bearing waters and corresponding buffer acreages were determined for each watershed for each ESU. For watersheds that occur in multiple ESUs, the largest crop acreage was used for calculations in this analysis. This is consistent with the economic analysis for other activities. This may lead to an overestimated impact for particular ESUs.

Table H-1 Derivation of Per Acre California Net Cash Farm Income Estimate per Crop Category			
Commodity Group	**Net Cash Farm Income of Operation ($1000)**	**Total Acres Harvested Statewide**	**Net Cash Farm Income per acre ($/acre)**
Fruit and tree nut farming (NAICS code 1113)	$2,141,716	3,319,545	$645.18
Vegetable and melon farming (NAICS code 1112)	$1,531,264	1,590,689	$962.64
Oil seed and grain farming (NAICS code 1111)	$57,685	1,192,449	$48.38

The net cash farm income per acre generated by each of the three types of agricultural production within California was then applied to the salmon buffer acreage estimates to produce the value of agricultural production within the 100 and 20 yard buffers in each ESU.

Table H-2 presents the estimated impacts of the pesticide restrictions for both the 20 yard and 100 yard buffers, for each ESU as well as for all ESUs combined.[3]

[3] The estimate of the aggregate impacts for all ESUs is not equal to the sum of the estimates for the individual ESUs because some of the ESUs overlap.

Table H-2 Annual Economic Impacts of Pesticide Restrictions due to Implementation of Buffer Areas				
ESU	**Fruit and tree nut farming**	**Vegetable and melon farming**	**Oil seed and grain farming**	**Total net cash farm income in buffer areas**
20 Yard Buffer				
California Coastal chinook salmon	$817,532	$12,993	$38	$850,563
Central Valley spring-run chinook salmon	$1,353,012	$1,156,818	$115,981	$2,625,811
Central California Coast O. mykiss	$1,392,795	$158,114	$1,887	$1,552,796
California Central Valley O. mykiss	$2,370,732	$1,600,157	$130,041	$4,160,930
Northern California O. mykiss	$89,363	$7,554	$38	$96,955
South-Central California Coast O. mykiss	$338,930	$1,425,534	$7,236	$1,771,700
Southern California O. mykiss	$169,539	$338,107	$5,305	$512,951
ALL ESUs	$4,361,669	$3,589,501	$144,512	$8,095,682
100 Yard Buffer				
California Coastal chinook salmon	$3,981,259	$67,211	$180	$4,048,650
Central Valley spring-run chinook salmon	$6,765,328	$6,192,215	$571,445	$13,528,989
Central California Coast O. mykiss	$6,640,676	$784,985	$9,003	$7,434,664
California Central Valley O. mykiss	$12,112,567	$8,950,487	$651,937	$21,714,991
Northern California O. mykiss	$445,888	$31,497	$150	$477,535
South-Central California Coast O. mykiss	$1,614,877	$7,052,786	$34,428	$8,702,091
Southern California O. mykiss	$875,908	$1,732,025	$26,476	$2,634,409
ALL ESUs	$21,696,415	$18,556,922	$722,005	$40,975,342